

Approaches to learning, age, ethnicity and assessment. Implications for widening participation

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Abstract

This study investigated age- and ethnicity-related effects on approaches to learning and the possible impact of such differences on assessment outcomes. This is important in the context of widening participation and the growing number of students from non-traditional educational backgrounds. Some 77 Level 1 psychology undergraduates completed an approaches to learning questionnaire and stated their ethnic group and age. Assessment outcomes for an examination and a coursework essay were also analysed. Age was found to be related to a desirable approaches profile, while Black African and Black Caribbean students were found to have higher surface scores than the two White groups in the analysis. The White British group performed better in the examination than the other groups, while there was no difference in coursework assessment. The implications for teaching and assessment practices are discussed

Approaches to learning

THE concept of deep and surface approaches to learning was originally conceptualised by Marton and Saljo (1976), since when the constructs have been developed and refined. Entwistle (2000) characterised the deep approach as students demonstrating a quest for meaning, monitoring understanding, relating ideas and using evidence. In contrast, a surface approach is characterised by fear of failure, routine memorising and simply doing enough to meet minimum course standards. Entwistle and Ramsden (1983) added a third 'strategic' approach, which is motivated by the desire to achieve high grades and is characterised by good time management and well-organised study methods. Approaches to learning are not stable psychological attributes, but the result of an interactive process involving the student, the teaching context and the broader educational environment (Biggs, 1993). Nevertheless, a deep approach can be considered as the most desirable of approaches, and should logically be expected to correlate with assessment outcomes given the right learning environment.

Conversely, a surface approach is considered undesirable and therefore likely to be negatively related to assessment outcomes. The strategic approach can also be considered as positive although more in terms of organisation and motivation, and should be related to desirable assessment outcomes.

Several approaches to learning questionnaires have been developed, to measure student approaches to learning. Biggs developed the Study Process Questionnaire (SPQ; Biggs, 1987b) and the Learning Process Questionnaire for secondary (high) school children (LPQ; Biggs, 1987a). The Approaches to Study Inventory (ASI) and Revised Approaches to Study inventories (RASI) were developed by Entwistle and his colleagues (Entwistle & Ramsden, 1983; Tait & Entwistle, 1995). Tait, Entwistle and McCune (1998) went on to develop the Approaches and Study Skills Inventory for Students (ASSIST), which is used in the present study. The three approaches – deep, surface and strategic – are divided into sub-scales. For the deep approach these sub-scales are: seeking meaning, relating ideas, using evidence and integrating ideas; for the

strategic approach: organising study, time management, achieving, monitoring effectiveness and alertness to assessment demands and, for the surface approach: syllabus-boundness, lack of purpose, unrelated memorising and fear of failure. This detail is included to clarify the nature of the three constructs, but for the purpose of the present study the main deep, surface and strategic scales will be used rather than their sub-scales.

Approaches to learning and achievement

A number of studies have investigated the relationship between approaches to learning and achievement in various academic disciplines. Of particular relevance to this study are those that have tested psychology students. In a Norwegian study which included 151 psychology students (using the ASSIST questionnaire of Tait *et al.*, 1998), a surface approach only was negatively related to examination marks in first-year psychology students (Diseth, 2003). A further study by Diseth and Martinsen (2003) showed a similar pattern for the surface approach, and a relationship with strategic approach also emerged for psychology students. Provost and Bond (1997) investigating 175 psychology students found no relationship between a deep approach (using a shortened version of the Approaches to Studying Inventory: ASI, Richardson, 1990) and marks in either multiple-choice tests, an essay or project report, and a very weak relationship between surface approach and achievement in the essay assessment only.

It therefore appears that the expected relationships do not emerge in an entirely consistent pattern among psychology students, although the surface approach appears to be the most reliable variable.

Approaches to learning, achievement and age

Another aspect of diversity within the student population is that of age, with many universities, particular the post-1992 universities in the United Kingdom, having very large proportions of mature students. The

term 'mature' is of course problematic ranging as it does from 21 to, potentially, 101, with differing issues facing students as they progress from young adulthood through, for example, possible parenthood to perhaps studying as a pensioner. Given the financial, time and emotional investment of mature students, it is important to understand factors that affect their learning, retention and attainment.

Little research has been carried out among psychology students. However, investigating age as a factor in approaches to learning and assessment outcomes, Richardson (1994, 1995) has concluded on the basis of a literature review, and a study comparing the approaches (ASI) of 38 mature with 60 non-mature social science students, that mature students tend to demonstrate a deeper approach than school-leavers accompanied by lower scores on the surface scales. Academic performance was no different between the two groups. Duff (1999, 2004; using the RASI) reached broadly similar conclusions about approaches to learning, observing significant differences between age-groups and correlations with age for the deep approach, with more modest differences and relationships observed for surface and strategic approaches.

In contrast, in a study of 146 social science students (Duff, Boyle *et al.*, 2004), none of the relationships reached statistical significance, with the relationship between deep approach and age being the largest (.27). No significant relationship between age and academic achievement was observed.

Zeegers (1999) examined the difference in approaches (SPQ) of 112 recent school leavers compared to 88 mature students and found that on entry to university, the former group had significantly less favourable deep and surface approaches than the latter group. Zeegers also observed that there was a positive relationship between age and grade point averages for students early in their course. In a later study (Zeegers, 2004), no significant correlations were observed between grade point average and age or between approaches and age.

Thus again, a mixed picture emerges, although with a pervading theme that increasing age is more reliably associated with desirable approaches, but not with desirable assessment outcomes as such.

Approaches to learning and achievement across cultures and ethnic/racial groups

Another important aspect of widening participation is the diversity of the student body in terms of ethnicity. Is it in fact the case that all students approach their studies in the same way irrespective of their nationality, racial group or culture? Again, it is not possible to draw on studies of psychology students.

Entwistle, Tait & McCune (2000) contrasted approaches to studying (ASSIST) across three groups, to assess the effects of context and the relationship with attainment. The three groups included two British samples (over 1700 students in total) and 219 students from a disadvantaged South African University. Similar patterns of approaches were found in all groups. Watkins and Mboya (1997) (using LPQ, Biggs, 1987a) found that the constructs were reliable and valid for South African secondary school children who had deeper approaches than either Australian or Hong Kong children of the same age.

Studies that have looked at the issue of approaches and attainment in the context of cultural or ethnic groups have produced mixed finding. Watkins (2001) conducted a meta-analysis of approaches to learning and achievement, looking at cultural differences. He did not carry out a comparison of cultural differences in approaches themselves; however, he reviewed 55 separate studies that looked at the relationship between approaches and achievement from a variety of different cultures including Hong Kong, Australia, Japan and China. From the summary of all these studies, it is clear that correlations are generally modest, with the most consistent relationships being found among Australian students, particularly when the SPQ was used. Studies from the United Kingdom indicated that a deep approach was the

most reliable using the ASI. In the meta-analysis itself, weak, non-significant correlations between approaches and academic achievement emerged both in Western and non-Western cultures. As Watkins points out, this is disappointing, and suggests that the assessment system may be the problem as it encourages superficial learning strategies.

Sadler-Smith and Tang (1998, cited in Zeegers, 2004) compared the relationship between approaches (RASI) and academic achievement in business studies' students from Britain and Hong Kong. Approaches did not predict achievement in the latter group. In a within-country study of racial differences Mpofu and Oakland (2001) investigated the relationship between approaches (LPQ) and achievement in a multi-cultural middle-class school in Zimbabwe (mean age 12.3) and found that 'compared to white students (n = 129), black students (n = 157) who reported higher use of a deep approach had lower academic grades' (p. 20), indicating incongruence between motivation and achievement.

Ethnicity, age and achievement

Van Dyke (1999) identified the importance of monitoring student progress and identifying curricular, assessment method and other factors which may be a barrier to the progression and achievement of certain groups of students. She reported that the relationship between age and ethnicity on attainment outcomes in two London universities was variable. Of particular relevance to this study is the effect of type of assessment. African students on a business studies degree performed better than their white counterparts on coursework, but more poorly on the examination component of assessment. Although age was not considered directly as a variable in relation to attainment, students who started their degrees following Access courses performed more poorly than did students who had A levels. It seems reasonable to assume that the former group would generally be older than the latter. Certainly, a smaller proportion of older students com-

pleted their degrees in the normal time-span and although this could be for a variety of reasons not necessarily associated with poor learning outcomes, the data overall indicate that older students may be at a disadvantage.

The present research was carried out at a university with similar equality and diversity issues to those investigated by Van Dyke (1999).

The present study

Psychology undergraduate students at the British university used in the present study are highly diverse in terms of age and cultural, ethnic and other socio-cultural and socio-economic factors, yet as the above review suggests, although a number of cross-cultural studies have been carried out, few studies have looked at whether ethnic groups within one system differ in their approaches to learning. Further, if differences do exist, what impact does this have on assessment outcomes?

In view of the relationship between approaches and attainment in earlier studies, it is predicted that relationships will emerge between approaches (particularly 'surface') and assessment scores, and between approaches and age. With respect to ethnic group variations in both approaches and attainment, no specific predictions are made as this study is exploratory in nature.

Method

Design This study is of a mixed within- and between-groups design. The independent variables are age and ethnicity. Approaches to learning scores (deep, surface and strategic) are used as both independent and dependent variables, depending on the analysis, and assessment marks for Level 1, Semester 1 units (one unseen examination and one essay), are dependent variables.

Participants Participants were made up of two year groups of Level One Psychology undergraduate students, 110 took part. Eleven 12 ethnic groups were represented in the sample as shown in Table 1.

However, in the final analyses only 77

were used due to the size of all groups except four: Black Caribbean, Black African, White British and Other White. Of these, 66 were female and 11 male. Age range 18–51, mean 25.17 (SD 7.23).

Assessments The first assessment used was an unseen examination (essay question format) for an introductory course looking at social and developmental cognition. The second assessment was a coursework essay for an introductory unit looking at the history and philosophy of psychology as a science.

Materials The Approaches to Study Skills Inventory for Students (ASSIST: short version. Tait *et al.* 1998) was used. The inventory consists of 52 items, each with a scale of 1–5 ranging from 'disagree' to 'agree'. The measure provides scores for Deep, Surface and Strategic Approaches. The first two constructs have a range of 16–80, while the Strategic Approach has a minimum of 20 and a maximum of 100.

A short questionnaire was also compiled relating to students' age and ethnicity and requesting their permission to use their assessment results in the study.

Ethnic group	Number of students
Black Caribbean	15
Black African	17
Other Black	4
Pakistani	6
Other Asian	9
White British	32
White Irish	3
Other White	13
Indian	7
Bangladeshi	3
Chinese	1
Total	110

Table 1: Frequency of distribution of students to the 11 groups that made up the original data-screened sample.

Procedure For the 2003/4 year group, all first year students present at the introductory *lecture* for a compulsory Semester 2 unit took part. For the 2004/2005 year group the participants were all students who attended the introductory *seminars* for the same unit. All participants completed the ASSIST questionnaire. In addition, students were asked to give personal details including their age, ethnic origin, and to give permission for their Semester 1 assessment marks to be used in this study. The purpose of the study was explained to them and the anonymity of individuals was assured. This process took place before students received their Semester 1 marks, which were subsequently matched to the individual approaches scores using student ID numbers. Students were later given detailed feedback about their ASSIST scores and the implications of their approach to learning.

Results and Discussion

Descriptive and reliability statistics approaches to learning and assessment marks are presented in Table 2.

Preliminary analyses

Once outliers, and participants with missing data had been excluded, only four groups had sufficient numbers for meaningful analysis. These were the Black African, Black Caribbean, White British and Other White groups. Only these groups will therefore be included in the subsequent analyses.

In order to eliminate the possibility of systematic differences between the two year groups and male and female participants, two multivariate analyses of variance were carried out. The first entered deep, strategic and surface approaches to learning as the within-participants variables, with year group, sex and ethnic group as the between-groups factors and age as a covariate. Proportions for the three approaches scores were calculated in view of the different score range of the strategic approach compared to the other two. The second analysis entered the two assessments (social and developmental psychology exam and psychological thinking coursework) as the within-participants variables, with the same between-group factors and covariates as the first analysis plus the three approaches as covariates. There were no significant effects of year group or sex in either analysis. Year group and sex will therefore not be included in the main analyses.

Correlational Analysis

To give an overall picture of the relationships between approaches, assessment outcomes and age, correlational analysis was carried out and is presented in Table 3.

Deep and strategic approaches to learning were found to be strongly and significantly related to each other. However, in this sample, the relationships between surface and both other approaches although negative as expected, were not significant.

Approach and Assessment	Mean	Standard Deviation	Cronbach's Alpha
Deep	62.84	8.72	.83
Strategic	73.82	11.54	.85
Surface	45.84	9.40	.79
Examination	50.36	13.91	
Coursework ^a	58.28	8.14	

^a Only 46 students took this assessment.

Table 2: Means and standard deviations of assessment marks and approaches (including reliability statistics)

Correlations between the two assessment marks were significant as expected. Examination marks were also significantly related to all three approaches. These findings are partially consistent with those of Diseth (2003) who found a significant relationship between surface approach and examination marks only, and Diseth and Martinsen (2003) who observed relationships between marks and both surface and strategic approaches. The present findings contrast with those of Provost and Bond (1997) who found no significant relationships. However, in their study, the exam was multiple choice and therefore essentially a different method of assessment.

With respect to the coursework, the only significant relationship with approaches was a negative relationship with surface approach. Provost and Bond (1997) noted similar findings for a second-year psychology essay. In the present study, the subject matter of this assessment was challenging for Level 1 students. Few of the essays demonstrated the level of use of evidence and meaning-seeking (Entwistle, 2000) that would be expected if a deep approach had been adopted. Some students who attempted to adopt a deep approach simply may not have been able to do so effectively. On the other hand, a surface approach would have been a particular handicap, reflecting the observed shortcomings in

understanding and inappropriate application of examples.

The relationship between age and approaches to learning was positive and significant as predicted for both deep and strategic approaches and negative but non-significant for the surface approach. These results are therefore a hybrid of those found by Duff (1999, 2004) and Duff *et al.* (2004), and support the notion that surface approach is less strongly associated with age than is the deep approach.

No relationships between age and assessment marks emerged. This is consistent with Richardson (1994, 1995) and Duff *et al.* (2004). The overall picture, that age is related to approaches but not to achievement is perplexing. It suggests that without a desirable approaches profile, mature students might fare worse than their younger counterparts.

Approaches, age and ethnicity

In order to determine the inter-relationship between approaches, age and ethnicity and between-group differences in approaches, multivariate analysis of variance was carried out, with the three approaches as within-participants variables, ethnic group as the between-groups variable, and age as a covariate. Approaches were calculated as proportions for this analysis in view of the different range of the strategic scale compared to the other two.

	Age	Deep Approach	Strategic Approach	Surface Approach	Mark for Exam
Deep Approach	.357 ^b (77)				
Strategic App.	.433 ^b (77)	.718 ^b (77)			
Surface App.	-.181 (77)	-.172 (77)	-.094 (77)		
Mark for exam	.042 (69)	.240 ^a (69)	.273 ^a (69)	-.353 ^b (69)	
Mark for Coursework	.027 (46)	.161 (46)	.162 (46)	-.304 ^a (46)	.456 ^b (46)

^a Correlation is significant at the 0.05 level (2-tailed). ^b Correlation is significant at the 0.01 level.

Table 3: Correlations between approaches and assessment marks.
Number of participants in parentheses

Significant effects were observed for the interaction between approaches and age ($F(2, 144) = 12.78, p < .001$) and the interaction between approaches and ethnic group ($F(6, 144) = 4.05, p = .001$).

While the test of between-group differences for ethnic group was not significant, age significantly adjusted the mean ($F(1, 72) = 4.75, p = .033$), suggesting that age plays a role in moderating the differences in approaches of the four ethnic groups.

Pairwise comparisons of the individual approaches indicate that they differ significantly from each other. See Table 4.

Having established that multivariate interactions are present, a series of follow-up tests was carried out to explore the simple effects. Means for the different approaches by ethnic group both before and after adjustment for age are presented in Table 5.

Age was found to significantly adjust the means in analysis of all three approaches (Deep: $F(1, 72) = 9.09, p = .004$; Strategic: $F(1, 72) = 13.28, p = .001$; Surface: $F(1, 72) = 4.79, p = .032$).

In contrast, the only differences in approaches between ethnic groups was

Approach	Mean	Standard Error	p value
Deep	.73	.015	.001
Strategic	.68	.016	.001
Surface	.47	.016	.001

Table 4: Approaches to learning: Mean proportions and pairwise comparison significance values.

observed in the analysis of surface scores only. ($F(3, 72) = 6.71, p < .001$). Pairwise comparisons indicated that Black African and Black Caribbean students had significantly higher surface approaches than both the White British ($p < .001$ and $p = .014$ respectively) and Other White groups ($p < .001$ and $p = .003$ respectively). This finding is cause for concern, given the observed correlations between surface scores and assessment.

Assessment, approaches, age and ethnicity

In order to establish the relationships and effects on assessment generally of approaches, age and ethnicity, a multivariate analysis of variance was carried out with examination

Ethnic group	Approach	Unadjusted mean	Standard Deviation	Adjusted Mean	Std. Error
Black Caribbean (15)	Deep	.68	.16	.68	.03
	Strategic	.66	.16	.67	.03
	Surface	.53	.11	.53	.03
Black African (17)	Deep	.76	.13	.74	.03
	Strategic	.72	.13	.69	.03
	Surface	.54	.15	.56	.03
White British (32)	Deep	.72	.13	.73	.02
	Strategic	.64	.15	.65	.02
	Surface	.44	.14	.43	.02
Other White (13)	Deep	.79	.11	.78	.04
	Strategic	.72	.10	.71	.04
	Surface	.37	.12	.38	.04

Table 5: Approaches to learning: adjusted and unadjusted mean proportions as a function of ethnic group. Number of participants in parentheses.

mark and coursework mark as the within-participants factors, ethnic group as the between-group factor and age and the three approaches scores as covariates. The only effect to emerge was an interaction between assessment type and ethnic group ($F(3,37) = 3.74$, $p = .02$). Pairwise comparisons indicated that the White British Group performed better overall in the assessments (Mean 60.27, SD 1.69) than either the Black African (Mean 49.46, SD 2.33, $p = .001$) and Other White groups (Mean 49.19, SD, 3.11, $p = .003$). For completeness of information, the Black Caribbean group had an overall mean of 57.03 (SD 3.12).

Pairwise comparison of the two assessment marks indicated that the examination mark was significantly lower than the coursework mark (Mean 50.02, SD 1.73; and Mean 57.95, SD 1.27 respectively; $p < .001$).

None of the interactions between assessment and the covariates emerged as significant. This is unsurprising with respect to age, given the absence of a relationship between age and assessment marks noted earlier. However, particularly with respect to including three approaches as covariates, the issue of collinearity between the deep and strategic approaches emerges. Nevertheless, as Table 6 shows, the combined effect of the covariates made a numerically evident difference to the means, suggesting that

approaches and ethnicity in this analysis are not independent of each other.

Means for the simple effects in the ethnic group by assessment interaction are shown in Table 6.

The simple effects (comparing the adjusted means) were analysed. What was particularly striking in this comparison was that the White British group did not differ in the mean mark for the two assessments, while all other groups performed markedly worse in the examination than in the coursework. The group most adversely affected was the Black African group and post hoc comparisons indicated that the difference was significant ($p = .011$). The difference was also significant for the Other White groups ($p = .035$). What is also apparent is that there is little difference between the ethnic groups in the coursework. This was borne out by post-hoc tests on coursework. In contrast, post-hoc tests of between-group differences in the exam marks showed that the White British group performed significantly better than the Black African and Other White groups ($p < .001$ and $p = .004$ respectively). The Black Caribbean group also performed better than the Black African group ($p = .043$).

It is worth noting that, while the means for the Black Caribbean group in particular were adjusted upwards by the combined

Ethnic group	Assessment	Unadjusted mean	Standard Deviation	Adjusted mean	Std. Error
Black Caribbean (7)	Examination	49.29	13.76	53.33	4.48
	Coursework	58.14	4.59	60.73	3.29
Black African (11)	Examination	40.91	10.09	41.93	3.35
	Coursework	55.81	7.18	56.98	2.46
White British (20)	Examination	60.45	10.32	60.12	2.43
	Coursework	60.95	8.49	60.49	1.79
Other White (7)	Examination	49.42	13.16	44.71	4.47
	Coursework	56.57	9.72	53.67	3.29

Table 6: Examinations and coursework: unadjusted and adjusted means as a function of ethnic group. Number of participants in parentheses.

effects of the approaches and age covariates, the opposite pattern emerges for the Other White group. This suggests two related things: that with a more favourable approaches profile – particularly with respect to the surface approach – the Black Caribbean group might perform better and conversely, that a more positive approaches profile contributes to the performance of the Other White group.

It should be noted that there is a lack of power in the current analysis due to the fact that only 45 participants completed both the examination *and* the coursework (the coursework was only undertaken by single honours students, while the examination was undertaken by both single and combined honour students). This has rendered the Black Caribbean and Other White groups particularly small (seven participants in each). Despite this, what emerges is that White British students and to a lesser extent the Black Caribbean students appear to have had an advantage in the examination relative to the Black African and Other White groups.

General discussion

In summary, in this study approaches to learning were more strongly related to marks in examinations than to marks for coursework essays, with the surface approach being the only one which was significantly related to marks in both assessments. Age was related to deep and strategic approaches, and age also significantly adjusted the ethnic group approaches means. There was no relationship between age and marks in any of the assessments. With respect to the relationship between ethnic group and approaches, all groups had similar profiles with respect to deep and strategic approaches, but the Black African and Black Caribbean students had higher surface scores relative to the White British and Other White groups. The most surprising and alarming finding in terms of equality and diversity was, however, the numerical disparity between the White British students and all other groups in

examination performance, particularly when compared to the coursework. This general discussion will now focus on the age and ethnicity findings.

The finding that approaches may become more positive with age is consistent with, for example, Richardson (1994, 1995), Duff (1999, 2004) and Zeegers (1999) who found that learning strategies and approaches respectively are dynamic and amenable to change. As older students have not been found to perform differently to younger students either in the present study or, for example, Richardson (1995), the better approaches profile of older students suggests that positive approaches may ‘protect’ them from performing worse than younger students.

What is essentially new is the notion that the effect of age may not be consistent across ethnic groups. Speculatively, this could be due to cultural variations in previous educational background and/or subsequent work cultures. Ethnicity is quite likely simply to be a proxy for socio-economic factors and it may be that those in the black groups have had less exposure to work environments where deep approaches to information management is required.

In contrast to the findings of Mpofu and Oakland (2001), white students were not found to have statistically higher ‘deep’ scores nor lower ‘strategic’ scores than black students. In fact, in contrast to Mpofu and Oakland, in the present study, significant differences between the black and white students emerged only for the ‘surface’ approach. This profile of approaches among the black students in this sample may reflect an aspiration to have a deep approach to learning, but a tendency to default to surface strategies under stressful conditions such as the revision for and participation in examinations. Such a dissonant approach to learning has been observed by Entwistle *et al.* (2000) when comparing high- to low-achieving groups, with the latter showing a similar pattern of approaches to those observed here.

With respect to academic achievement, what is clear from this study is that, compared with all other groups, White British students fare better in examinations. As this group is the population around which tertiary educational practice has developed over time, it is perhaps unsurprising that examinations, a traditional assessment method, seem to favour them. The Black Caribbean group is the next strongest in the examination and again are likely to have experienced secondary education in the United Kingdom whereas many of the Black African and Other White students may not have done. The Black Caribbean students' mean mark was adjusted upwards considerably by controlling for age and approaches, reducing the difference between this group and the White British group considerably. This suggests that finding ways to enhance the adoption of desirable approaches profile would be worthwhile.

The pattern of assessment marks for Black African students (equivalent to other ethnic groups in coursework, but particularly disadvantaged in an examination) is consistent with Van Dyke (1999). Examinations often carry more weight than coursework in final marks. If the accumulating evidence that some groups find exams more difficult than others is found to be robust in future research, practice in this regard may need to be reviewed.

The relatively high 'surface' score of the black student group, despite a high 'deep' score, may also be a contributory factor to their relatively poor performance in the examination. Indeed, Mpofu and Oakland (2001) also reported that black school children, even if they reported a deep approach, did not fare as well with their academic grades (examination based) compared to their white counterparts.

This explanation does not account for the fact that the other white group were also disadvantaged in the examination compared to the White British group. The Other White group had the most positive approaches profile of all groups, which may have protected

them from performing even more poorly in the examination. It is also worth noting that for many of the Black African and Other White students, English is a second language. This is likely to be a particular disadvantage in an examination when students are under time-pressure and cannot monitor and check their English as effectively as for coursework.

An acknowledged weakness of this study is the small group sizes, particularly when it came to the analysis of assessment outcomes, and therefore strong claims for generalisability cannot be made.

Further research is thus needed to see whether the findings in this study will be replicated. Of particular importance is the question of whether the examination format confers advantage to White British students in other cohorts and other disciplines. To that end further research is already underway. The role of approaches in moderating between-group differences warrants further investigation in order to aid the design of assessments and study skills support to promote positive approaches and prevent the application of surface tactics. The 'protection factor' that positive approaches appear to confer to older students and the 'Other White' group, also needs further study using a larger sample. The omission of factors such as prior educational attainment and socio-economic factors in this study must be rectified in further study of the effects observed here, particularly as prior educational attainment has been found to be the most significant predictor of university performance in studies by, for example, McKenzie and Schweitzer (2001) and Zeegers (2004).

If the findings observed in this modest study are found to be robust, the challenge will be to effect policy change in assessment strategies to ensure equality of opportunity between students from different age and ethnic groups.

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